

Appendix C

KY 163 South Crash Analysis

Methodology

Safety along KY 163 in the project study area was analyzed using crash analysis. Crash analysis is an analysis tool for finding roadway sections with abnormally high crash rates and, therefore, sections with potentially correctable hazards to traffic safety. Historical crash data from the five-year period January 2002 – December 2006 was used to identify the KY 163 study area roadway sections with abnormally high crash rates, thus indicating a possible need for safety improvements. Only crashes with a valid mile-point listing were considered in the analysis. Crash analysis procedures involve assigning reported crashes to roadway locations by mile-point. Crashes are normally classified by severity into one of three categories: fatal, injury, or property damage only (PDO). Then, the average crash rate for roadway sections of various lengths is determined. Generally, the analysis procedure includes analyzing the entire roadway length under study, followed by analyzing successively smaller roadway sections, especially those containing higher concentrations of crashes. Roadway sections are classified as either spots or segments depending on their length — sections less than 0.30 miles are classified as a spot location, and sections over 0.30 miles are classified as a segment. Roadway section crash rates were normalized for comparison by either hundred-million-vehicle-miles traveled (HMVM) for segments, or millions-of-vehicles (MV) for spots. Using the average crash rate, for similar roads throughout the state, the critical crash rate is obtained from Kentucky Transportation Research Center's (KTRC) *Analysis of Traffic Crash Data in Kentucky (2000-2004)*. The critical crash rate is the maximum crash rate expected to occur on a roadway section, given the statewide average crash rate for that functional road class, the average daily traffic (ADT) volume, and the roadway section length. The ratio of these two rates (*i.e.*, the actual crash rate to the critical crash rate) produces a critical rate factor (CRF), or a measure of crash frequency for each segment or spot location. If the roadway section's actual crash rate exceeds the critical rate (*i.e.*, the CRF is greater than 1.0), then that section is classified as a high crash location. In other words, if the CRF exceeds 1.0, then that highway section has more crashes than is statistically probable based on random occurrence. If the CRF is between 0.90 and 1.0, then that section is considered a potentially high crash location, with the potential increasing as 1.0 is approached.

Number of Crashes

Following is *KY 163 South Crash Analysis Monroe County*, which is the detailed crash analysis for KY 163 in the project study area, with selected mile point (MP) locations identified for reference. No high crash locations (*i.e.*, CRF greater than 1.0), nor potentially high crash locations, were identified. Exhibit 2, *Functional Class, Traffic Analysis and High Crash Areas*, provides a graphic presentation of the high crash areas as identified by the public. The eight-mile section of KY 163 in southern Monroe County examined had only 27 recorded crashes. Of the 27 crashes reported, there was 1 fatality crash, 21 injury crashes, and 5 property damage only crashes. The fatality crash occurred near MP 1.0, which is in the

vicinity of E. Woods Road. A visual examination of the data reveals that crashes in the study area tend to be concentrated at locations expected to have a relatively high probability of potential conflict, with generally a relative absence of crashes in all other areas. That is, crashes are occurring at or near crossroads/intersections, commercial facility locations, and at locations with limited/restricted visibility and poor roadway geometrics.

Crash Locations

Despite the apparent lack of documented crash data in the state database, local residents, including the elected officials and local agency officials, asserted that safety on KY 163 south was an issue, and identified numerous incidents and locations of crashes, some with fatalities. A few of their identified crash sites corresponded favorably with the database records. A few residents had first hand knowledge of crashes and crashes with fatalities. Under reporting of crashes was generally attributed to the driver's desire to not establish a record of the crash. According to the local residents, crashes included both passenger vehicles and large trucks, and were mainly single-vehicle crashes, although a few multi-vehicle crashes were recalled. Despite a notable Amish presence in the area, no one could recall a conflict between an Amish horse buggy and a motor vehicle. However, many recounted dangerous situations with a high potential for a conflict with either the buggy or a dismounted passenger.

During the public involvement process which was based on citizen and official input, five key areas were identified as high crash areas:

- Marshall Curve in the north, just south of the proposed Tompkinsville Bypass. There is an "S" curve in this area that is on a grade. The combination has resulted in many crashes and fatalities.
- Northern Lumber Mill. The roadway geometries in this three-lane section are standard. The problem is a combination of careless driving, for this is the first passing opportunity in some distance, and the proximity of equipment and supplies associated with the lumber mill.
- Reed Ford Road / End of 4-Lane Section. At this site, the southbound outside lane ties back into the through lane in a left-hand curve. Traffic on the outside lane must merge left to get back into the through lane and then continue veering left to negotiate the curve. Several vehicles have failed to make both movements and run off the road.
- Hestand Area/KY 216 intersection. KY 163 in Hestand is a combination of sharp curves, rolling hills, and poor sight distance. The KY 163/KY 216 intersection occurs at a very oblique angle at a curve on a hill top just south of Hestand.
- Curves North of Tennessee. For the southern mile of the corridor, KY 163 is a combination of very hilly and curvy alignment.

Crash Types

Table 4, *Crash Type Statistics*, lists factors contributing to crashes on the KY 163 roadway in terms of percentage of all crashes. Exhibit 2, Functional Class, *Traffic Analysis and High Crash Areas*, provides a graphic presentation of the crashes. To reflect current conditions as closely as possible, only the most recent data available (*i.e.*, from January 2002 through December 2006) was used in this analysis. These crash factors can be used in analyzing crash causes and indicating potential solutions. Examining Table 4 reveals the majority of crashes are occurring on dry roads, which tend to limit weather conditions as a major contributing factor affecting the safety on KY 163 in the study area. Additionally, about 59 percent of crashes are occurring during daylight hours, which tend to reduce the importance of low light conditions as a contributing factor affecting safety.

Fixed object and roadway departure crashes are the most common types of crashes reported at 24 percent for each crash type, and represent 48 percent of all crashes on KY 163 South. These two crash types are closely related and typically involve a single vehicle impacting immobile objects such as a tree, utility pole, fence, guardrail, earth embankment or ditch, signpost, animal, etc. Contributing factors to fixed object crashes include excessive speed for roadway conditions, poor highway geometrics, and emergency action to avoid colliding with an object on the roadway (*e.g.*, another vehicle, agricultural equipment, animal, etc.).

The category “other” crashes accounts for about 19 percent of all reported crashes, and involves a unique grouping of crashes, such as falling out of a vehicle.

Head on crashes represent about 14 percent of reported crashes. Head on crashes can occur at intersections (*i.e.*, crossroads and driveways) due to right of way conflicts; and on the mainline due to drivers failing to maintain control and staying within their driving lane, or to improper passing procedures. Contributing factors to head-on crashes include excessive speed and limited sight distances, both of which can be heavily influenced by roadway geometrics (*e.g.*, sharp curves, steep hills, limited visibility, and limited passing opportunities).

Rear end crashes typically occur because of large differentials in travel speed, limited/restricted sight distances, and congestion (*e.g.*, turning into/out of access drives or roads; stop and go driving). Rear end crashes occur at a rate of about 10 percent.

Sideswipe crashes in the study area represent about 9 percent of all reported crashes, and tend to indicate involvement of roadway geometric issues. Sideswipe crashes can include both “same direction” sideswipes and “opposite direction” sideswipe crashes. In certain circumstances, “head-on” crashes could be interpreted as a more severe type of opposite direction sideswipe crash. Sideswipe crashes are commonly due to drivers changing lanes without checking the adjacent lane for traffic, and mainly occur on multi-lane roadways in congested areas. Since the majority of the KY 163 roadway has only one-driving lane in each direction, other factors must be considered. Contributing factors to both sideswipe crashes and head-on crashes can be attributed either to drivers failing to maintain control and staying within their driving lane, or to improper passing procedures. Both of these

contributing factors can be heavily influenced by roadway geometrics (e.g., sharp curves, steep hills, limited visibility, and limited passing opportunities). As Table 2 in the narrative, *Geometric and Traffic Characteristics of Existing Highway* indicates, significant sections of KY 163 roadway exist where the passing sight distance is insufficient to provide safe passing opportunities. Additionally, almost all of KY 163 south is striped and/or signed as “no passing.”

The crash analysis did not identify any high crash rate roadway sections in the project study area. Poor/restricted visibility, speed differentials between vehicles, driver error, and limited passing opportunities — combined with a roadway not meeting current design standards — are the likely leading factors for crashes on KY 163. This argument is supported by the documented poor visibility on this roadway (see Table 2). Any roadway improvement satisfying the project goal of improving visibility and roadway geometrics will, in turn, satisfy the goal of improving safety on KY 163.

Table C1 Crash Type Statistics (Table 4 in Report)

Begin MP	End MP	Length (miles)	Total Crashes	Crashes			Type of Crash					
				During Daylight Hours	Clear	On Dry Roadway	Head On	Rear End	Side-swipe	Ran Off Road	Fixed Object	Other
KY 163, Monroe County												
0.00	8.53	8.53	27	59%	45%	64%	14%	10%	9%	24%	24%	19%

Source: KYTC Highway Information System (HIS). Research period January 2002 to December 2006